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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/820,227	04/08/2004	Joannes Theodoor De Smit	081468-0309173	6925
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909 7590 08/17/2006

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EXAMINER

MATHEWS, ALAN A

ART UNIT	PAPER NUMBER
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2851

DATE MAILED: 08/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/820,227	<b>Applicant(s)</b> DE SMIT ET AL.	
	<b>Examiner</b> Alan A. Mathews	<b>Art Unit</b> 2851	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-15, 17, 20, 23 and 25-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 5-11, 14, 15, 20, 23, 25, 27 and 28 is/are rejected.
- 7) ☒ Claim(s) 3, 4, 12, 13, 17, 26, 29 and 30 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>4/8/04 &amp; 5/25/06 &amp; 7/17/06</u> | 6) <input type="checkbox"/> Other: ____.  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 5, 7, 8, 20, and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by the Japanese patent document 6-124873 (cited in Applicant's IDS filed May 14, 2004, along with an English translation). The Japanese patent document 6-124873 discloses in figure 1 a support structure 5 for holding a patterning device (reticle) 1 (see paragraphs #0014-0018 of the English translation). Substrate table 13 and 14 holds substrate 2. Element 4 is the projection system. Element 22 (pump) is the liquid supply system to fill the space between the projection system and the substrate with liquid 30. The heat control 21 would be the selective heater to selectively control the temperature. Since heat control 21 controls the temperature of liquid 30, it would also help control the size of the bubbles or foam (see paragraph # 0018 and # 0020). As evidence of this relationship between bubble size and temperature, a patent to Takahashi (U. S. Patent No. 6,343,422) discloses in column 2, lines 12-15, "**the size of air bubble sealed in the bubble tube changes widely according to the environmental temperature**". Takahashi '422 is merely cited to show evidence of the well-known relationship between bubble size and temperature, and is not part of a 35 USC 103 rejection. With respect to claim 2, paragraph #

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0020 discloses that refractometry equipment 24 makes a homogeneous measurement of the liquid, and therefore would detect bubbles. With respect to claim 5, paragraphs # 0020 discloses “foam in the liquid 30 -----are removed”. Paragraph # 0024 also discloses “air bubbles in a liquid 30 ----are also removed”. With respect to claim 8, paragraph # 0025 discloses pressurizing the liquid. With respect to claim 20, paragraph # 0020 discloses refractometry equipment 24.

***Claim Rejections - 35 USC § 102***

3. Claims 1, 5, 6, 10, 11, 23, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi (U. S. Patent No. 5,610,683). Figures 1 and 2 disclose a lithographic projection apparatus with a radiation system 3, a support structure 5 for supporting patterning means (reticule) 1, and a substrate table 9 for holding substrate 2. A liquid supply system for filling a space between the final element 7 of the projection system and the substrate with liquid 23 includes elements 19, 20, 21, and 25-3. The liquid supply system includes element 22 which is a bubble reduction means (see column 6, lines 38-42, and column 7, lines 30-35). Column 6, lines 32-35, disclose controlling the temperature of the liquid. Controlling the temperature of the liquid would help control the size of the bubbles. As evidence of this relationship between bubble size and temperature, a patent to Takahashi (U. S. Patent No. 6,343,422) discloses in column 2, lines 12-15, **“the size of air bubble sealed in the bubble tube changes widely according to the environmental temperature”**. Takahashi '422 is merely cited to show evidence of the well-known relationship between bubble size and temperature, and is not part of

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a 35 USC 103 rejection. Returning to the main rejection, controlling the temperature of the liquid in Takahashi '683 would require a heater. To control the temperature, one would need to selectively turn or turn off the heater, or selective turn the heater up or down. With respect to claim 10, column 7, lines 50-55 of Takahashi '683 disclose removing the bubbles before the cassette is loaded in the exposure apparatus. With respect to claims 6 and 11, column 6, lines 42-45 disclose a vacuum pump 24 for providing a negative pressure within the cassette to remove bubbles in the liquid 23. With respect to claim 28, column 5, lines 55 – 60 , disclose inputting foreign particles. Whatever inputs particles is considered to be a particle input device, and whatever removes particles is considered to be a particle removal device (e.g. filter etc.)

4. Claim 28 is rejected under 35 U.S.C. 102(e) as being anticipated by Levinson (U. S. Patent Application Publication No. 2005/0037269 A1). Levinson discloses in figures 1 and 2, a support structure for patterning means (mask) 18, a substrate table for substrate 12, and a projection system 20. A liquid supply system includes element 32 (paragraph # 19) for supplying a liquid 24 (see paragraph # 16) between the final element 36 of the projection system and the substrate 12. Paragraphs # 0013, # 0017, and # 0018 discloses **particles 28** in the liquid 24. **Whatever caused the particles to be in the liquid is considered to be a particle input device.** Paragraph # 0032 discloses techniques or equipment for forcing out or dissolving the foreign body 28, which would be a particle removal device

5. Claim 28 is rejected under 35 U.S.C. 102(e) as being anticipated by Pawloski (U. S. Patent Application Publication No. 2005/0048223 A1). Figures 1 and 2 and pages 2 and 3,

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paragraphs # 22 - # 30, disclose a support structure for patterning means (mask) 18, a substrate table for substrate 12, and a projection system 20. A liquid supply system includes element 32 (paragraph # 19) for supplying a liquid 24 (see paragraph # 29) between the projection system and the substrate. Paragraph # 0033 discloses moving **particles** left to right by ultrasonic waves which move from left to right. Whatever introduces the particles is considered to be a particle input device. Paragraphs # 0029 and # 0040 and figure 2 further discloses a bubble (particle) reduction means 34. This is a particle removal device.

*Claim Rejections - 35 USC § 103*

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over the Japanese patent document 6-124873 as applied to claim 1 above, and further in view of the Japanese Patent document 10-303114 (cited on Applicant's PTO-1449 filed May 14, 2004). The Japanese patent document 6-124873 discloses the invention except for disclosing that the composition of the liquid is chosen to have a lower surface tension than water. The Japanese Patent document 10-303114 discloses in the Abstract putting an additive in the liquid used in immersion lithography which reduces the surface tension of pure water. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide the Japanese patent document 6-124873 with liquid having a lower surface tension than water in view of the Japanese Patent document 10-303114 for the purpose of improving the properties of the liquid and thus producing a better final product.

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7. Claims 14 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi '683 as applied to claim 5 above, and further in view of Pawloski et al. Takahashi '683 discloses the invention except for a bubble removal means including two spatially separated ultrasonic transducers trapping bubbles in nodal positions. Pawloski et al discloses in paragraph # 33 and # 36, moving particles left to right by the ultrasonic waves which move from left to right. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide Takahashi '683 with a bubble removal means having ultrasonic standing wave patterns with nodal regions in view of Pawloski et al. for the purpose of providing better bubble removal and thus producing a better final product.

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi '683 as applied to claim 5 above, and further in view of Dulneveld et al. (U. S. Patent Application Publication No. 2005/0174549 A1). Takahashi '683 discloses the invention except for disclosing an electric field generator for dislodging bubbles. Dulneveld et al. discloses in figures 4 and 5 using an electric field to dislodge bubbles. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide Takahashi '683 with an electric field generator to dislodge bubbles in view of Dulneveld et al. (U. S. Patent Application Publication No. 2005/0174549 A1). The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by

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another”; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

9. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi '683 as applied to claim 25 above, and further in view of Levinson (U. S. Patent Application Publication No. 2005/0037269 A1). Takahashi '683 discloses the invention except for disclosing a liquid quality monitor capable of switching an operational state. Levinson discloses in paragraph # 29 deferring exposure when there is identification of a foreign body. Paragraph # 32 further discloses alerting the operator or waiting a predetermined period of time and taking a corrective action upon detection of a foreign body 28. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide Takahashi '683 with a liquid quality monitor capable of switching operational states in view of Levinson for the purpose of providing better control of the equipment.



*Allowable Subject Matter*

10. Claims 3, 4, 12, 13, 17, 26, 29, and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

*Conclusion*

11. The patents cited in the PTO-1449s are cited for the same reasons they were cited in Applicant's IDS statements. The Application Publication No. 2006/0126043 A1 is cited to show the family member of WO 2004/053958 A1 cited in a Search Report, and cited by Applicant in an earlier IDS.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan A. Mathews whose telephone number is (571) 272-2123. The examiner can normally be reached on Monday through Friday from 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diane Lee can be reached on (571) 272-2399. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Alan A. Mathews  
Primary Examiner  
Art Unit 2851

AM